Green Finance in Banking Industry: A Systematic Literature Review Using Bibliometric Analysis

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Abstract

Every area of the global economy faces several environmental problems and their consequences on day-to-day operations. Due to the growing threat of global climate change, the concept of green finance receives increasing attention in recent economic literature. Our research indicates that green securities, green investments, low carbon finance, green insurance, green credit and green infrastructure bonds, ... are the topics of existing studies on green finance illustrating positive developments in the banking background. Bibliometric Analysis is used to identify and analyze large volumes of scientific data and date is taken from the Web of Science. Research result shows that green finance in the future will be one of the crucial keys for the development of the banking industry. The result of this study will support banks that are looking to move towards an environmentally friendly direction on key issues to consider in the adoption and development of green finance.

Research purpose:

By analyzing the main aspects of the research articles using keywords "green finance" and "banking", our bibliometric analysis proposes on pointing out the development trends of green finance in the banking industry in the recent period, creating a basis for predicting future development trends of green finance, especially in the banking field.

Research motivation:

In recent years, the number of research on green finance has increased a lot, especially in 2021. Digital finance, renewable energy sources, technological innovation...is one of the emerging trends, they include the tools to support green finance and the most useful measures to connect finance and the environment. In addition, there are research papers about the relationship of banking field and green finance and how it affects the environment, with the aim of finding parallel directions between environmental protection combined with promoting development of the banking field as well as the finance field sustainable while saving cost, time and human resources. Therefore, that is the driving force that motivated us using the bibliometric method to analyze and research trends about green finance, especially in the banking sector.

Research design, approach, and method:

In our study, we extracted data from Web of Science (WoS) database on March 17 2023. We filtered keywords for the research options: "green finance" and "banking" or "green finance banking" in the title, abstract, keywords and author's keywords. We use the function Biblioshiny with R and VOSviewer for analyzing data.

Main findings:

Our research also shows that investment and development in some aspects such as green bonds or low-carbon economy, ... could be one of the sustainable and effective economic trends in the future. In the era of increasing concerns about climate change, green finance tends to be environmentally friendly but still brings a lot of value to investors and companies. In addition, our research also predicts that in the future green finance will play a key role in redirecting industries that are harmful to the environment and will also have a great impact on business management and development of the banking

industry. Therefore, green finance needs extensive support and investment policies from companies, investors as well as the government.

Practical/managerial implications:

The bibliographic analysis in this study provides guidance for practitioners in the multifaceted research topic. This study opens up many research topics for those who want to pursue and contribute to sustainable economic development strategies. These documents in our study serve as a foundation for those interested to get the most complete, basic understanding for further in-depth research. Besides that, we also provide a certain understanding so that researchers can outline the direction and strategy of banking development along with green finance.

Keywords: Green finance, Sustainable finance, environmental finance, climate finance

1. INTRODUCTION

By 2030, the Sustainable Development Goals (SDGs) of the United Nations will be accomplished worldwide, and climate change and environmental protection are vital elements of these attempts. That led to policymakers and researchers having recently concentrated on green finance because of the globally growing concern for environmental preservation, climate change, and sustainable development (Akomea-Frimpong, Adeabah et al. 2022) . According to (Dörry and Schulz 2018), "green finance" can be a significant key to achieving the SDGs, particularly goals 11, 12, and 13 of SDGs. Moreover, green finance has gained widespread acceptance and is now of greater interest to academics. In 2016, green finance attracted a great deal of interest at the G-20 nations' eleventh conference celebrated in Hangzhou, China (Henry Schäfer, 2018). In addition, the International Financial Corporation (IFC) describes green finance as an investment strategy that protects the environment, assures social equality, and fosters a nation's economic success (Liu, Wang et al. 2019). Thus, considerable global study is required for green finance. (Rahman, Moral et al. 2022).

"Sustainable finance", "environmental finance", "climate finance", and "green investment" are some of the terms used to describe green finance (Rahman, Moral et al. 2022). Green finance was described by (Lindenberg 2014) as the practices and financial decisions made by financial institutions to promote a green economy. More specifically, green finance is the deployment of resources and financial system investments in ecologically responsible or sustainable enterprises (Weber and ElAlfy 2019). Financial resources should be allocated to social inclusion, corporate governance, clean energy, green building, environmental preservation, and clean energy throughout the economy, in keeping with the principles of green finance (Yuan and Gallagher 2018).

The role of the banking industry in environmental sustainability and preservation has recently received a great deal of attention in multilateral conferences like the Paris Agreement, with the G-20 nations affording the subject major consideration in their plans (Sarma and Roy 2021). Green finance has recently been popular in the banking industry as a strategy to safeguard banks and society from unforeseen future economic concerns (such as climate change, financial instability, social unrest, etc.) (Ziolo, Filipiak et al. 2019). As a result, the traditional banking concept is changing to supply environmentally sustainable goods (Dikau and Volz 2021). During the One Planet Summit held in Paris in December 2017, central banks and leading banking institutions from around the world committed to supporting the development of environmentally sustainable financial solutions. Additionally, the World Bank (WB) has announced that it will no longer accept funds from corporations or nations that do not prioritize environmental conservation and sustainability (Zhang, Geng et al. 2022).

2. DATA COLLECTION AND RESEARCH METHODOLOGY
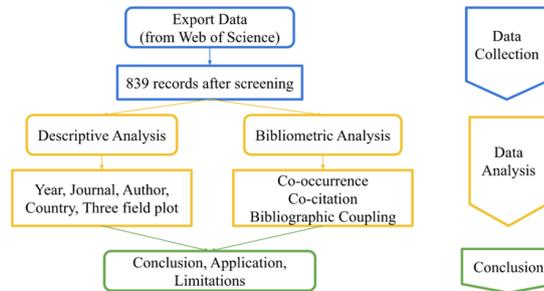
Fig 1. Process of Researching using Bibliometric Analysis

2.1 Data Collection

In our study, we extracted data from Web of Science (WoS) database on March 17 2023. According to the research of (Birkle, Pendlebury et al. 2020), The Web of Science (WoS) Core Collection database is a selective citation index of scientific and academic publications, including journals, conferences, books, and data collections. We filtered keywords for the research options: "green finance" and "banking" or "green finance banking" in the title, abstract, keywords and author's keywords. After screening and filtering for all specified criteria (language: English; subject area: business & economics, management, development policy, financial policy; document type: article; source type: journal), we extracted a data file (.txt) with 839 publications.

2.2 Research methodology

In this study, we use the function Biblioshiny with R (based on: R version 4.1.1, Bibliometrix package version 3.1.4) for descriptive analysis to create a comprehensive viewpoint beside the use of bibliometric analysis. By using both descriptive and bibliometric analysis, we can perform a broad perspective on the development of green finance over time. Statistics by descriptive analysis will cover through:

- The number of publications annually published relating.
- The most relevant journals, authors.
- Nations distributions of top authors.
- The relationship among authors, nations, and keywords greatly contributing to the field.

With Bibliometric analysis, we choose to use VOSviewer (VOSviewer - Visualizing scientific landscapes) for analyzing data. VOSviewer is a powerful network analysis tool to help users who are not good at coding or technology can visualize data easily. According to the research of (Van Eck and Waltman 2010), VOSviewer is an effective tool for network analysis that supports in visualizing the dynamics and structures of science or in the research of (Valenzuela, Merigó et al. 2017) also mentioned that this is an analysis tool to conduct bibliometric analysis based on database like Scopus, Web of Science, etc. We choose 3 aspects of Bibliometric analysis to analyze data: co-occurrence, co-citation and bibliographic coupling. Co-occurrence analysis is used to cluster essential topics in the research domain, whereas bibliographic coupling and co-citation analysis are utilized to generate an academic basis and perform developing trends in the field of green finance. The overlay visualization's categorization of keywords according to color range also produces perspective pictures.

3. SYSTEMATIC LITERATURE REVIEW ON GREEN FINANCE IN BANKING INDUSTRY

### 3.1 Analysis by published Year
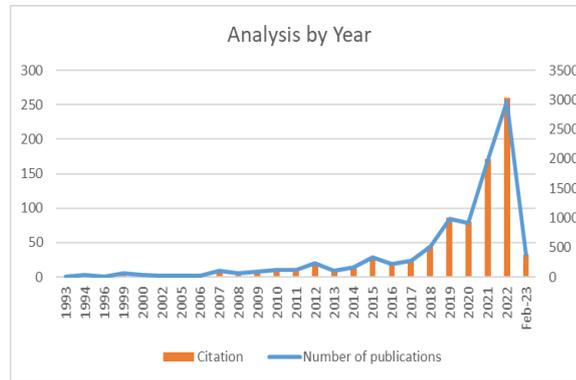
Fig 2. Annual Scientific Production of research from 1993-2023

The statistics of research on green finance increased dramatically between 1993 and February 2023. There were approximately 9 publications in 2007. However, in 2021, that number had risen to 168 publications, and in 2022, it reached 254 publications. As a result, this issue is becoming acknowledged as the crucial foundation for other breakthroughs that stimulate academics to conduct ongoing research and discover new knowledge. The rising citation index is evidence that green finance in the banking industry is now widely accepted and discussed. Green finance undoubtedly contributes significantly to the growth of the banking sector and the global economy overall.

3.2 Analysis by Journal

Table 1. Top 10 journals with the greatest number of publications and impact in "Green Finance" using Biblioshiny with R

Sources	Number of Articles	Citation	H-index
CLIMATE POLICY	42	207	14
ENERGY ECONOMICS	39	929	15
ENERGY POLICY	35	1073	20
JOURNAL OF SUSTAINABLE FINANCE & INVESTMENT	30	262	12
BUSINESS STRATEGY AND THE ENVIRONMENT	23	371	13
ECONOMIC RESEARCH-EKONOMSKA ISTRAZIVANJA	22	53	7
FINANCE RESEARCH LETTERS	20	501	11
ECONOMIC ANALYSIS AND POLICY	18	95	8
TECHNOLOGICAL FORECASTING AND SOCIAL CHANGE	16	405	11
JOURNAL OF RISK AND FINANCIAL MANAGEMENT	13	58	5

Table 1 shows that the Journal of Climate Policy is in the lead for the topic of "Green finance" with 42 articles, 207 citations, and an h-index impact of 14. Journal of Energy Economics is in second place with 39 articles overall, 929 citations, and 15 h-index impacts. With 35 publications, 1073 citations, and 20 h-index impacts, Energy Policy is in the third position. We can see that the top 3 publications are all related to the environment, indicating that "green finance" is a major concern in this industry. Journals of business, economics, finance, and banking, on the other hand, came after the top 3, demonstrating that, aside from the environmental sector, "green finance" also has a significant impact on the banking sector in particular as well as the economy in general.

Because the bibliometric method mainly uses keywords to filter articles related to research papers' keywords. In the case of our research article, the keywords used are "green finance" and "banking" or "green finance in banking" on the World of Science database. As the results, the above journals are the ones with the most research papers related to the content about green finance in banking. This is also a research gap in our study mentioned in the limitation part.
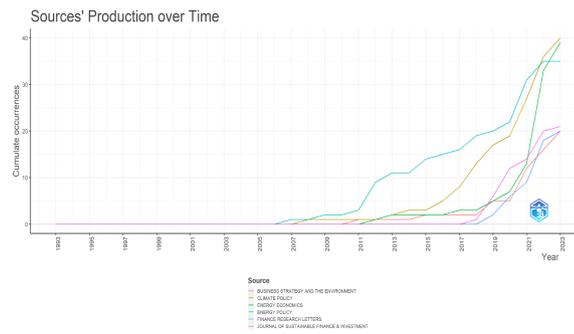
Figure 3. Top sources' Production of research from 1993- 2023

Figure 3 illustrates the changing trends of the research on the topic of Green Finance using statistics on the number of papers published on this issue over time by highly recognized journals: Business Strategy and The Development, Climate Policy, Energy Economics, Energy Policy, Finance Research Letters, Journal of Sustainable Finance & Investment. In 2007, Energy Policy published its first article about "Green finance". After that, other journals also published articles about that topic, creating the gradually developing trends in researching "Green finance". Recently, scientific research about the topic "Green finance" has caught a great deal of attention. Especially from 2020 to 2022, there are more and more journals choosing this topic to publish their articles.

### 3.3 Three fields plot to visualize the relationship among authors, countries, keywords
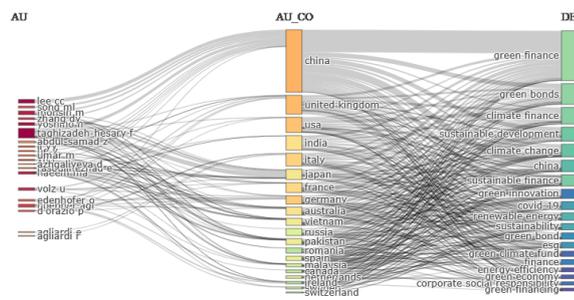
Fig 4. Three fields plot visualizing how authors, countries, and keywords are related through a Sankey diagram

This three-field plot provides details on the most well-known authors and popular research topics in each country. The relationship between the authors and the country is illustrated on the figure's left side. Leading authors including Chi-Chuan Lee, Malin Song, Muhammad Mohsin, and Farhad Taghizadeh-Hesary compose almost 30% of the papers published in China. Farhad Taghizadeh-Hesary, Yong-Yi Li, Dina Azhgaliyeva are just a few of the eminent authors who contribute to about 15% of United Kingdom papers. Nearly a total of Japan papers were published by Farhad Taghizadeh-Hesary, Naoyuki Yoshino. Nearly ⅓ articles about green finance in Vietnam were produced by Muhammad Mohsin, Zulkiflee Abdul-Samad, Muhammad Abubakr Naeem, Ehsan Rasoulinezhad. The relationship between countries and keywords is shown on the figure's right side. It is obvious that among the countries, green finance is the issue that is most frequently researched, with China, the United Kingdom, and Japan acting as the major research centers. The authors from the USA seem to have an interest in a broad range of topics, including green bonds, climate financing, climate change, etc. In addition to green finance, other countries, including India, Italy, France, Germany, and others, have researched topics connected to green finance, such as green bonds, climate finance, sustainable development, and green innovation. Many authors from China, the United Kingdom, the United States, and Italy were also quite interested in the topic of green bonds at the same time.

3.4 Bibliometric Analysis with top 10 most frequent keywords

Keywords from the author's research papers used to analyze the co-occurrence network. The aim is to identify the main research areas of green finance in banking. Less important topics related to green finance may still be included in these keywords, so we only consider keywords that appear at least 7 times to ensure a more specific level of clarity about the concepts discovered. Table 2 below shows the parameters of the 10 most frequent keywords.

Table 2. The most frequent keywords in co-occurrence network

Keywords	Number of Links	Total Link Strength	Occurrences
green finance	67	244	165
green bonds	42	129	89
sustainable finance	36	104	57
sustainable development	45	100	52
climate change	41	93	47
climate finance	36	89	60
sustainability	38	74	31
china	28	54	39
finance	28	22	44
renewable energy	24	31	44
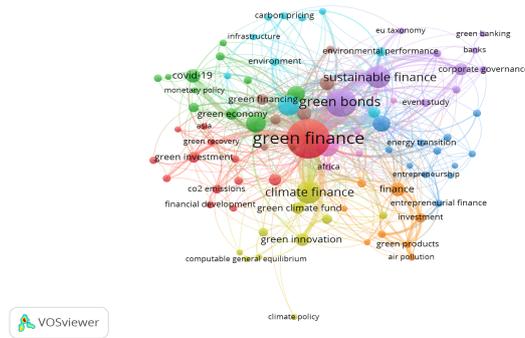
Fig 5. Co-occurrence network in green finance

Table 3. High Occurrence Keywords in each Cluster

Cluster (number of keyword)	Definition	High Occurrence Keywords
Cluster 1 - red (13)	Types of an operating process of green finance	asia, carbon emission, clean energy, co2 emissions, economic growth, energy efficiency, financial development, green credit, green credit policy, green finance, green investment, green recovery
Cluster 2 - green (12)	Impact causes and policies to improve	banking, china, covid-19, environmental policy, environmentally sustainable, fiscal policy, green economy, green growth, green new deal, monetary policy, pollution, renewable energy
Cluster 3 - blue (12)	Greening economic areas	circular economy, corporate finance, crowdfunding, eco-innovation, energy transition, entrepreneurial finance, entrepreneurship, environmental, financialization, smes, sustainability, sustainable investment

Cluster 4 - yellow (10)	Instruments and impacts of financial channels on the environment and climate	climate finance, climate policy, computable general equilibrium, digital finance, environmental regulation, financial constraints, financing constraints, green climate fund, green finance policy, green innovation
Cluster 5 - purple (10)	Crucial factors to the development of green finance	banks, corporate governance, corporate social responsibility, environmental protection, event study, financial performance, green banking, green bonds, sustainable finance
Cluster 6 - light blue (10)	Carbon pricing supports green recovery	carbon pricing, climate change, environment, environmental performance, green energy, india, infrastructure, innovation, paris agreement, political economy
Cluster 7 - orange (8)	Gradually "greening" applications and types to be more environmentally friendly	air pollution, finance, governance, green buildings, green products, impact investing, investment, technological innovation
Cluster 8 - brown (6)	Measurement criteria and investment decision-making process	bibliometric analysis, environmental finance, ESG, green bond, green financing, responsible investment

Cluster 9 - pink (5)	Positive consequences from previous processes	africa, developing, countries, development banks, financial institutions, sustainable development

The first cluster focuses on clean energy sources and the types required in green finance. By listing negative environmental factors such as carbon emissions and positive factors such as energy efficiency to outline the types that are needed. The main purpose is to overcome and eliminate factors that adversely affect the environment and promote methods to make the environment greener and cleaner. Green finance, green credit give rise to sustainable development, they play an extremely important role in implementing the green growth strategy while speeding up and effectively the economic development process, making an important contribution to global climate change. The above types work towards a green, carbon-neutral economy and contribute to the goal of limiting global temperature rise.

The second cluster examines the factors affecting the implementation of the green finance strategy. In other words, environmental pollution, covid-19,... is one of the reasons why green finance boomed so that it could prevent those negative things. Since then, implementing policies to improve, remedy and develop a greener, cleaner environment. For example, promoting green economy, green growth, focusing on promoting the renewable energy industry to reduce negative impacts on the environment, as well as creating sustainable financial policies to solve the problem. solving environmental problems step by step.

The third cluster includes new keywords related to the green economy (including: circular economy, symbiotic fundraising, ecological innovation). In particular, transforming the growth model towards greening economic sectors, applying the circular economy model through exploitation, economic and efficient use of natural resources and energy based on a scientific foundation. learning, applying digital technology and digital transformation, developing sustainable infrastructure to improve growth quality, promoting competitive advantages and minimizing negative impacts on the environment.

The fourth cluster revolves around what financial channels and instruments affect the environment and climate. Particularly noteworthy is the term "Climate Finance," which is a broad concept. It concerns the amount of money to be spent on all activities that will contribute to slowing climate change and helping the world achieve its goal of limiting global warming. Besides, climate policy (an academic journal for mitigating and adapting all climate problems), digital finance (digital banking services, digital payments, transfers) are also tools to support the transition to a green economy and promote sustainable economic development. These are channels that play a role in supporting the response and mitigation of impacts from climate change in developing countries.

In order to contribute to improving the quality of environment growth, promoting competitive advantages and minimizing negative impacts on the environment, it is necessary to appear in **the fifth cluster** - the factor that plays a key role in deciding that. For example, green bonds are being considered an effective means of raising capital from the private sector for projects with environmental and social benefits. Green banking is an important strategy in the sustainable development orientation of the banking system, granting preferential credits for projects to reduce emissions and new energy; carrying out many activities for the environment and reducing carbon emissions, such as encouraging customers to use green products and services… (Escap 2012).

The sixth cluster argues tools to control pollution, for instance, how to price carbon. Carbon emission pricing is a mechanism by which companies pay a sum of money in proportion to the amount of carbon dioxide (CO2) they emit into the environment in the process of their business operations. Carbon emission pricing helps prevent excessive energy extraction, use, and consumption by limiting and minimizing the profitability of such activities. For example, India's long-term low-carbon development strategy. They are committed to combating climate change, by offering options for developing the economy on a low-carbon path toward zero by 2070. (Asian Development Bank, 2021)

Not only finance, but other industries and types mentioned in **the seventh cluster** also play an important role in positively or negatively affecting the environment, such as investment in green building development is an inevitable trend. weak. The application of new environmentally friendly technological advances in the construction industry, or

more broadly, in the garment and textile industries, not only improves labor productivity, production efficiency, shortens progress, but also contributes to reducing pollution. environmental pollution, towards the development of green buildings and green products to ensure healthier living conditions for the community.

The eighth cluster includes essential keywords such as: ESG, Responsible Investment, Green Financing. Specifically, ESG (Environmental - Social - Governance) is a set of standards to measure factors related to the sustainable development of an enterprise. It includes environmental, social and corporate governance criteria. On the other hand, responsible investing or sustainable investing is bringing environmental, social and governance factors - ESG into the investment decision-making process, and those decisions will directly affect the bond market. If those are green funding decisions, they will create green bonds that contribute significantly to the positive development of the environment.

Finally, **the ninth cluster** sums up the positive effects of green finance on the world. In other words, poor countries or developing countries are also catching up with that pace. In Africa, for example, the African Development Bank launched a green finance deployment model across the continent. African Development Bank launches model for deploying green financing across the continent. *African Development Bank Group*.) Those are positive signs and motivations for organizations to increasingly promote this green financial model around the world. (Nyadera, Agwanda et al. 2022)

3.5 Bibliometric Analysis with Overlay Visualization

Fig 6. Overlay Visualization Network of Co-occurrence Analysis

In the Overlay Visualization analysis, we split the terms into different colors to rank the update of the keywords based on their occurrence and average annual publication count. Its occurrence in the document will be simulated by the size of the button by adjusting the size to suit that appearance. Specifically, the range of dark blue to near purple means that this keyword has been researched for a long time. Meanwhile, the range of green to lighter blue closer to yellow are keywords that have only appeared in recent publications.

In this study, keywords related to our research topic were in the publications *from 2018 to 2022*. Based on the majority color of the buttons in the figure, it can be inferred that the term "Finance" has been researched *from 2018 to early 2019*. In the previous period, studies on Finance mainly focused on the current state of environmental pollution without specific solutions. Most of the research papers focus on corporate social responsibility, financial performance and banking models. Moreover, from 2019 some phrases refer to factors that harm the climate such as carbon emissions. In addition to issues surrounding finance and governance, climate finance-related keywords such as innovation, climate finance, climate change and renewable energy have also been published in publications *from mid-2019 onward* showing clearer direction and solutions in innovation and sustainable development. *Since the beginning of 2020*, the most prominent the phrase green bonds and sustainable finance again, they appear with a dense frequency and are a hot topic during that time because green bonds are the type that contributes a lot towards sustainable finance. Extensively, keyword engagement becomes increasingly central *from 2020 onwards*, and the phrase Green finance only appeared and exploded in the period *from 2021*, researches gradually shifted from research on financial overview, banking and simple models to objectives, measures and specific tools to realize the concept of Green finance. Moreover, the Covid-19 pandemic broke out all over the world, which is an even more intense reason to strongly promote financial development to go hand in hand with the environment. Financial tools that contribute to the transition to a green economy appear more and more, in which new keywords related to green finance such as (ESG, Green investment,

Eco-innovation, Circular Economy) and other issues of social attention (covid-19, corporate social responsibility). And *from the middle of 2021 to 2022*, new and more modern research papers will appear such as: Digital Finance, Green Innovation, Clean Energy, and Technological Innovation,... These are the categories. The figure both shows the development of advanced technology and shows that finance is increasingly changing positively to the environment. When financial tools and channels are converted to online forms, it saves costs and waste from issuing financial products.

3.6 Bibliometric Analysis with Co-citation analysis

Co-citation analysis aims to identify clusters of knowledge in "green finance" research and find connections between them. Through this analysis, the paper has identified three distinct clusters with three different colors.
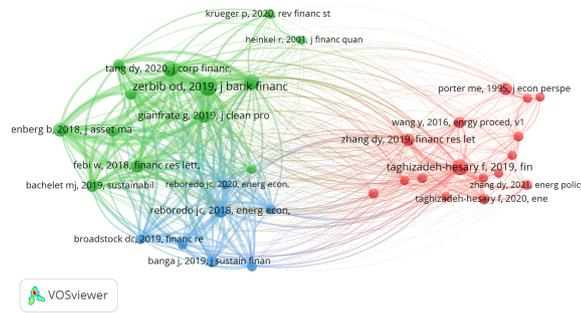
Fig 7. The co-citation network analyzed by VOSviewer software

Table 4. Co-citation network

Cluster	Concept	Representative research
Cluster 1 - Red (16 items)	Research on the role, current status and development trends of green finance as well as propose methods to solve the problem of green finance shortage.	(Taghizadeh-Hesary and Yoshino 2019) (Wang and Zhi 2016) (Zhang, Zhang et al. 2019) (Ng and Tao 2016) (Hafner, Jones et al. 2020)
Cluster 2 - Green (13 items)	Transitioning to a low-carbon economy and the advantages of issuing green bonds.	(Zerbib 2016) (Gianfrate and Peri 2019) (Flammer 2021)

		(Partridge and Medda 2020)
Cluster 3 - Blue (7 items)	Synergy and the price relationship between green bonds and financial markets.	(Reboredo 2018) (Tolliver, Keeley et al. 2020) (Reboredo and Ugolini 2020)

The first cluster (red) includes 16 items that mentioned the role, advantages and disadvantages of green finance as well as how to attract investors to participate in green finance development because there is a shortage as well as a lot of green finance. barriers to growth. Next, ***cluster 2 (green)*** with 13 items has been studied and shows that the low-carbon economy is currently a trend because it is environmentally friendly but still brings many positive values to the economy. Issuing green bonds is one of the right steps in that transformation. Finally, ***cluster 3 (blue)*** includes 7 items that researched the price relationship between green bonds and the financial market, and showed that the issuance of green bonds will bring a lot of benefits to the financial market. Therefore, that is the motivation for investors to participate in supporting the development of the green bond market because this can be one of the sustainable and effective economic solutions in the future.

3.7 Bibliographic coupling analysis- analysis by journal

In this analysis, we determine the threshold by setting the minimum number of documents of a source to 5 and the minimum number of citations of a source to 0. Only sources with at least 5 documents on the topic associated with the highest number of citations and total link strength were selected as the analysis range. Of the 329 samples, 29 sources are represented as meeting the thresholds.

Selected	Source	Documents	Citations ∨	Total link strength
☑	energy policy	35	1721	1481
☑	finance research letters	20	1036	1808
☑	journal of business ethics	8	1025	465
☑	energy economics	39	788	3762
☑	ecological economics	11	651	534
☑	journal of sustainable finance & inve...	30	524	2208
☑	climate policy	42	480	1149
☑	world development	8	447	160
☑	business strategy and the environme...	23	446	2458
☑	technological forecasting and social ...	16	414	2507
☑	global finance journal	9	251	1966
☑	economic analysis and policy	18	174	2106
☑	journal of risk and financial manage...	13	169	1783
☑	china finance review international	6	144	872
☑	economic modelling	8	141	1072
☑	international review of financial anal...	11	131	1296
☑	economic research-ekonomska istra...	22	101	1855
☑	emerging markets finance and trade	6	92	338
☑	climate and development	6	79	623
☑	green finance	11	73	850

Fig 8. The most influential journals of Bibliographic coupling analysis

In detail, the top 3 frequently cited sources are Energy policy (1721 citations), Finance research letters (1036 citations) and Journal of Business ethics (1025 citations) listed in the figure 8.
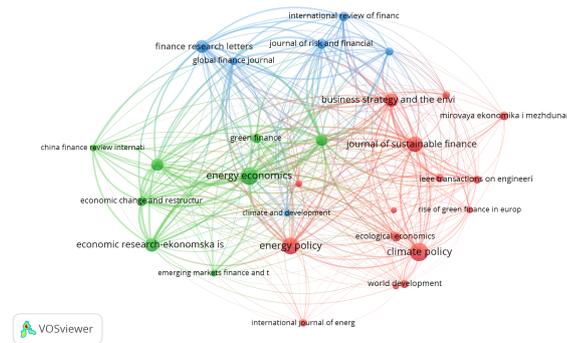
Fig 9. Bibliographic coupling network of journals

In the next analysis, these sources are divided into 3 clusters.

The green cluster includes 8 journals, two representative journals are Energy economics (39 documents) and Economic Research (22 documents). The journals in this cluster provide information on the current economy, such as the economy based mainly on non-renewable energy consumption such as: energy extraction, conversion and use, energy commodity markets and derivatives, regulation and taxation, forecasting, environment and climate, international trade, development and monetary policy related to energy consumption. From the journals belonging to the cluster above, researchers see green finance as an initiative to reduce economic crises based on energy sources, most recently, such as oil shock by implementing energy transition to energy green fuels. (Xu, She et al. 2023)

Finally, ***the blue cluster*** occupies 6 journals, including representative journals such as Finance Research Letters (20 documents) and Journal of risk and financial (13 documents). These journals mainly provide the latest information, publications, and a variety of financial market segments such as M&A, Emerging markets, asset valuation, Non-bank Financial Institutions, ... as well as other journals' types of risks, methods of financial risk management. Since then, Green finance has been assessed as a tool that directly supports adding value to the economy while promoting efforts to achieve sustainability goals. This is also an area of greening that has a great impact on banking governance and contributes to promoting the development of the banking industry (STAKE). Therefore, green finance needs increasingly diversified financial channels and instruments, increasing profitability and receiving supportive policies from the government to reduce risks and attract investment capital.

4. CONCLUSION, IMPLICATIONS AND LIMITATIONS

Bibliometrics is a popular and rigorous technique for identifying and analyzing large volumes of scientific data in a particular field, such as in journals. Key themes or trends in a particular academic publication or discipline can be better understood using this approach. In addition, bibliometrics allows us to unpack the evolutionary nuances of green finance and at the same time shed light on emerging issues in the field. Our paper provides a bibliographic summary of green finance research based on data taken from the Web of Science for the purpose of analyzing the development of research trends from different perspectives and times. different. Biblioshiny and Bibliometric research approaches use three specific methods: Bibliographic matching, Co-citation and Co-occurrence. According to the results of Co-occurrence analysis, areas such as climate finance, green bonds and sustainable finance in the field of green finance are potential topics for the author to conduct research. New keywords have emerged in recent years, such as digital finance, green innovation, renewable energy, etc., showing the positive development of the financial industry on the environment.

The authors regularly examine how green finance affects the environment to find effective solutions and the most suitable tools. In recent years, the number of research on green finance has increased a lot, especially in 2021. Digital finance, renewable energy sources, technological innovation...is one of the emerging trends, they include the tools to support green finance and the most useful measures to connect finance and the environment. In addition, in the past or in recent years, there are research issues that negatively affect the environment, with the aim of finding parallel directions between environmental protection combined with promoting development finance. sustainable while saving cost, time and human resources.

Our research also shows that investment and development in some aspects such as green bonds or low-carbon economy, ... could be one of the sustainable and effective economic trends in the future. In the era of increasing concerns about climate change, green finance tends to be environmentally friendly but still brings a lot of value to investors and companies. In addition, our research also predicts that in the future green finance will play a key role in redirecting industries that are harmful to the environment and will also have a great impact on business management and development of the banking industry. Therefore, green finance needs extensive support and investment policies from companies, investors as well as the government.

The bibliographic analysis in this study provides guidance for practitioners in the multifaceted research topic. Firstly, this study shows that the most prominent concerns in green finance can be mentioned as types of operations, their interrelated impacts on the environment and sustainability policies, financial channels and instruments, factors that attract investment decisions, ... Therefore, the following researchers can visualize an overall picture, and at the same time recognize the gaps in previous studies to continue to develop, explore, and discover new filling initiatives to overcome limitations for the topic of green finance. Next, by analyzing the main aspects of the research articles, our bibliometric analysis points out the development trends of green finance in the recent period, creating a basis for predicting future development trends of green finance - this opens up many research topics for those who want to pursue and contribute to sustainable economic development strategies. Thirdly, through co-occurrence and co-citation analysis, the study provides readers with highly reliable articles and researchers containing key information about green finance. These documents serve as a foundation for those interested to get the most complete, basic understanding for further in-depth research. Fourthly, the article lists the most influential and influential authors on the topic that researchers can refer to in the process of understanding green finance. Fifthly, based on the analysis results, the article recommends relevant journals that are widely used by many people, based on which, researchers can diversify the areas of discussion in the field of green finance.

This study has implications for banks, banking laws, managers, and the banking industry's competitive edge. The financial performance of banks will be improved, and corporate staff members of banks will comprehend the importance of promoting green financing to obtain a competitive edge. Banks could increase financial inclusion, develop new financial products, and improve corporate sustainability. Lastly, from the standpoint of policy development, the analysis in this paper could help managers and regulators frame regulations that take into account the demands of stakeholders, giving banks a competitive advantage in the banking sector. The study provides a certain understanding so that researchers can outline the direction and strategy of banking development along with green finance. The banking industry needs to research and implement solutions to synchronously develop green financial markets, especially the green bond market and institutional investors, creating a basis for banks to mobilize green capital on the Internet. market; take advantage of scientific achievements of the Fourth Industrial Revolution to greener banking operations.

There are some limitations with the paper. Firstly, in our study, we only used and extracted data from the database Web of Science. For that reason, it could have missed certain articles, affecting some results of the analysis in the study. Besides, gathering data at different times could have different analyses of results and conclusions.

Secondly, index and metrics differ between cited articles and uncited articles, not necessarily whether it has high quality or not. It is entirely possible for articles to receive a lot of citations but for bad reasons. Because there are many different reasons why authors cite other research: to discuss a specific research methodology, to highlight examples of prior research on the same subject, to support a viewpoint they make, or even to discuss instances of questionable methodology or deceptive results. Because the bibliometric method counts all citations identically regardless of the real reason for the reference, current bibliometric indicators are unable to take into account this diversity. Hence, we cannot be sure that a paper that has received a lot of citations is also having a lot of influence.

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